

# MATERIAL SAFETY DATA SHEET USER'S GUIDE



La prévention,  
j'y travaille!

# **MATERIAL SAFETY DATA SHEET USER'S GUIDE**

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\*Non-essential information for WHMIS purposes

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\*Non-essential information for WHMIS purposes

# INTRODUCTION

The role of the **Service du répertoire toxicologique of the Commission de la santé et de la sécurité du travail (CSST)** is to inform Québec employers and workers of the health and safety hazards of chemical or biological substances used in the workplace.

The purpose of this guide is to facilitate the understanding and use of the information provided on a material safety data sheet by defining, for example, a product's properties and by showing how to use the MSDS for prevention. A glossary of the main terms used in material safety data sheets, the measurement units, and the conversion factors most frequently used are also presented in the appendix.

## WHMIS WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM

WHMIS is a Canada-wide system for protecting the health and safety of workers by facilitating access to information on the hazardous materials used in the workplace. This system consists of three parts, namely material safety data sheets, labels and the worker training program.

For more information on WHMIS, consult the *Regulations* section of this guide.

# MATERIAL SAFETY DATA SHEET (MSDS)

A material safety data sheet is a document that provides information on a controlled product, namely its toxic effects, the protective measures for avoiding overexposure or chemical hazards, and the procedures to follow in an emergency.

A controlled product is a hazardous material meeting the hazard criteria defined in the *Controlled Products Regulations*. The information provided on the MSDS completes the information that is found on the label of a controlled product. The supplier sends the MSDS to the employer when the product is sold. It must be available in French and in English, be kept on the premises by the employer in a location known by the workers, and be easily and rapidly accessible to those who are likely to come in contact with the product.

## **INFORMATION TO DISCLOSE ON THE MATERIAL SAFETY DATA SHEET**

The material safety data sheet must contain nine categories of information. They can be presented under the following headings or under equivalent headings.

- Product information
- Information on the preparation of the MSDS
- Hazardous ingredients
- Physical data
- Fire and explosion hazards
- Reactivity data
- Toxicological properties
- Preventive measures
- First aid measures

The internationally harmonized material safety data sheet, consisting of 16 categories of information, is accepted in Canada insofar as it contains the information required by WHMIS and that it mentions that the product has been classified in accordance with the hazard criteria listed in the *Controlled Products Regulations*.

## PRODUCT INFORMATION

This section of the MSDS includes the following:

- Product identifier/name.
- Manufacturer's name, street address, city, province, postal code and emergency telephone number.
- Supplier identifier/name, street address, city, province, postal code and emergency telephone number, if it is different from that of the manufacturer.
- Product use.

The product's name indicated on the MSDS must be identical to the name written on the label.

### *Example*

#### **MATERIAL SAFETY DATA SHEET**

##### **PRODUCT IDENTIFIER/NAME :**

Toluène/Toluene

##### **MANUFACTURER'S IDENTIFIER/NAME :**

Produits chimiques ABC inc.

1234, rue ABC

Montréal (Québec) Z0Z 0Z0

Emergency telephone no. : 1 800 123-4567

##### **SUPPLIER'S IDENTIFIER/NAME :**

Distributions XYZ

123, rue XYZ

Québec (Québec) X0X 0X0

Emergency telephone no. : 1 800 987-6543

##### **PRODUCT USE :** Paint solvent

##### **LABEL :**



## PREPARATION INFORMATION

This section of the MSDS includes the following:

- Name and telephone number of the group, department or party responsible for the preparation of the material safety data sheet.
- Date of preparation of the material safety data sheet.

The material safety data sheet must be revised at least every three years or as soon as new pertinent information becomes available.

## HAZARDOUS INGREDIENTS

This section of the MSDS includes the following:

### CHEMICAL NAME AND CONCENTRATION OF INGREDIENTS,

- i) which are controlled products if they are present at a concentration equal to or greater than **0.1%** in the mixture (applies to ingredients that are teratogenic, embryotoxic, carcinogenic, toxic to reproduction, mutagenic and respiratory tract sensitizers). In other cases, ingredients that are themselves controlled products and whose concentration is above **1%** are disclosed;
- ii) which are on the ingredient **disclosure list**, if their concentration is equal to or greater than the concentration on this list (even if the ingredient is not a controlled product as defined in WHMIS);
- iii) which the supplier believes, based on reasonable grounds, **to be harmful to the health** of the workers;
- iv) whose **toxicological properties are unknown**.

The concentration is defined as being the amount of a component in the total amount of the mixture. It can be expressed as a percentage (%) and interpreted as being a ratio:

- Weight of component/weight of mixture (W/W), or
- Weight of component/volume of mixture (W/V), or
- Volume of component/volume of mixture (V/V).

On the MSDS, the actual concentration of the ingredient can be replaced by one of the following permitted ranges of concentrations, namely:

- from 0.1 to 1%
- from 0.5 to 1.5%
- from 1 to 5%
- from 3 to 7%
- from 5 to 10%
- from 7 to 13%
- from 10 to 30%
- from 15 to 40%
- from 30 to 60%
- from 40 to 70%
- from 60 to 100%

## **CAS REGISTRY NUMBER**

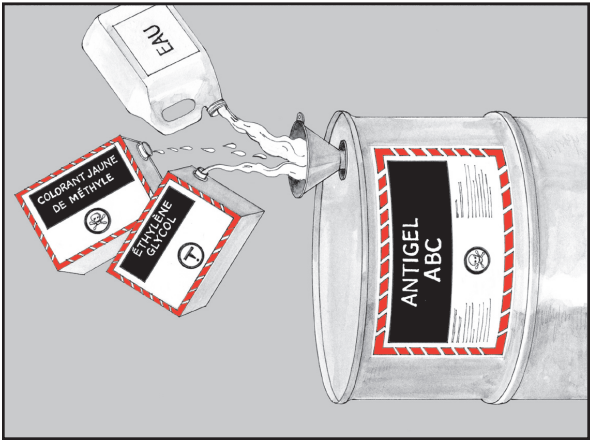
The CAS number is assigned by the *Chemical Abstracts Service*, a division of the *American Chemical Society*, to precisely identify a chemical substance.

## **LETHAL DOSE 50 (LD<sub>50</sub>)**

This is the amount of a substance that causes the death of 50% of the laboratory animals exposed to it orally (ingestion) or cutaneously. There are other routes of entry (for example by injection), but WHMIS does not take them into account.

## **LETHAL CONCENTRATION 50 (LC<sub>50</sub>)**

This is the concentration of a substance in the air that causes the death of 50% of the laboratory animals exposed to it by inhalation, generally for 4 hours.



|                                          |            |                      |                                                                                 |                        |  |
|------------------------------------------|------------|----------------------|---------------------------------------------------------------------------------|------------------------|--|
| <b>Examples</b>                          |            |                      |                                                                                 |                        |  |
| Pure product:                            |            |                      |                                                                                 |                        |  |
| <b>Hazardous ingredient</b>              | <b>CAS</b> | <b>Concentration</b> | <b>LD<sub>50</sub></b>                                                          | <b>LC<sub>50</sub></b> |  |
| Ammonia                                  | 7664-41-7  | 60-100%              |                                                                                 | Rat: 2,000 ppm/4 h     |  |
| Product composed of several ingredients: |            |                      |                                                                                 |                        |  |
| <b>Hazardous ingredients</b>             | <b>CAS</b> | <b>Concentration</b> | <b>LD<sub>50</sub></b>                                                          | <b>LC<sub>50</sub></b> |  |
| Methyl yellow                            | 60-17-7    | 0.1-1%               | Rat, oral:<br>200 mg/kg<br>Mouse, oral:<br>300 mg/kg                            |                        |  |
| Ethylene glycol                          | 107-21-1   | 60-100%              | Rat, oral:<br>4.7 g/kg<br>Mouse, oral:<br>7.5 g/kg<br>Rabbit, skin:<br>9.5 g/kg |                        |  |

## PHYSICAL DATA

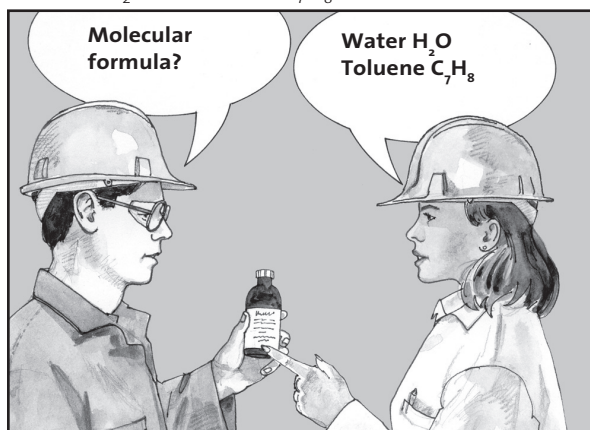
This section of the MSDS describes the physicochemical characteristics of a substance based on current scientific knowledge.

### MOLECULAR FORMULA

The molecular formula describes, using their symbols, the elements that make up a substance, and indicates their proportion. Pure substances are the only ones with a definite molecular formula.

#### *Examples*

**Water** :  $\text{H}_2\text{O}$ , **Toluene** :  $\text{C}_7\text{H}_8$



### MOLECULAR WEIGHT

This is the weight in grams of a fixed quantity of molecules of a chemical product. The molecular weight is defined only for pure chemical substances.

#### *Example*

**Toluene** : 92.15 g

## PHYSICAL STATE

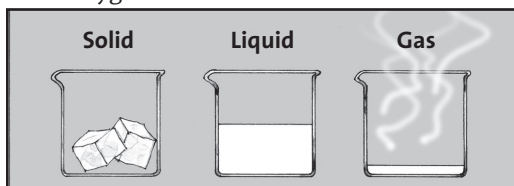
This is the form or state in which the product is present: gas, liquid or solid at ambient temperature (20°C) and at normal atmospheric pressure (760 mm Hg (101.32 kPa)).

### *Example*

**Solid** : lime

**Liquid** : water

**Gas** : oxygen



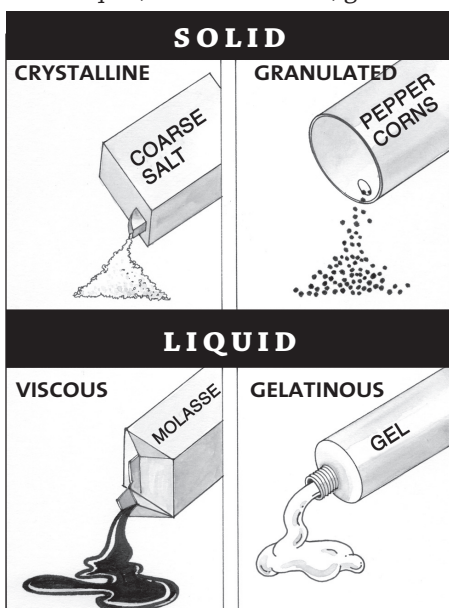
## APPEARANCE

This subsection provides specific information on the product or presents additional information on the product's physical state or appearance.

### *Examples*

If the product is solid, it can be crystalline, granular, powdery, etc.

If it is liquid, it can be viscous, gelatinous, oily, etc.



## COLOUR AND ODOUR

These are some of the product's physical characteristics. A product can have a specific colour or be colourless. It may have a characteristic and distinctive odour or be odourless. The odour of some products may be detected, starting at a certain concentration, namely the odour threshold.

### *Examples*

#### **Colour :**

- gray: copper sulfate
- colourless: water

#### **Odour :**

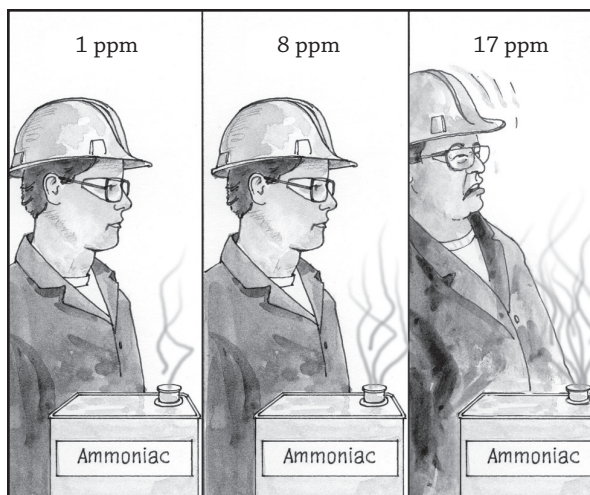
- aromatic: toluene
- characteristic: chloroform

## ODOUR THRESHOLD

This is the minimum concentration of a substance likely to be detected in the air by human smell. It is usually expressed in parts per million (ppm).

### *Example*

Ammonia can be detected at 17 ppm.



## DENSITY

**Density** is a physicochemical property related to the weight of a substance. It represents the weight of a substance per unit volume and is expressed in grams per millilitre (g/ml) at 20°C. **Specific gravity** is also a physicochemical property that is commonly used instead of density. However, it is a relative value that indicates how many times heavier than water the product is. If the density of a product that is rather insoluble in water is less than 1 g/ml, the product will float. However, if it is greater than 1 g/ml, the product will sink. This information is useful in predicting the behaviour of a product in the event of a leak or accident.

### *Example*

Toluene is not very soluble in water. Its density is 0.8661 g/ml, therefore less than 1, so it floats on water.

## FREEZING POINT

This is the temperature at which a substance goes from the liquid state to the solid state at normal atmospheric pressure (760 mm Hg (101.32 kPa)). The freezing point of a pure substance is the same as its melting point.

### *Example*

Water crystallizes at 0°C.

## MELTING POINT

This is the temperature at which a substance goes from the solid state to the liquid state at normal atmospheric pressure (760 mm Hg (101.32 kPa)).

### *Example*

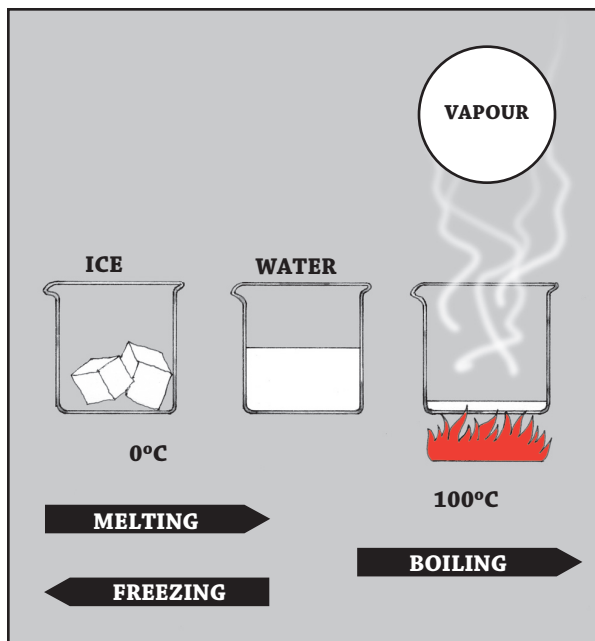
Ice melts at 0°C.

## BOILING POINT

This is the temperature at which a substance goes from the liquid state to the gaseous state at normal atmospheric pressure (760 mm Hg (101.32 kPa)).

### Example

Water boils at 100°C.

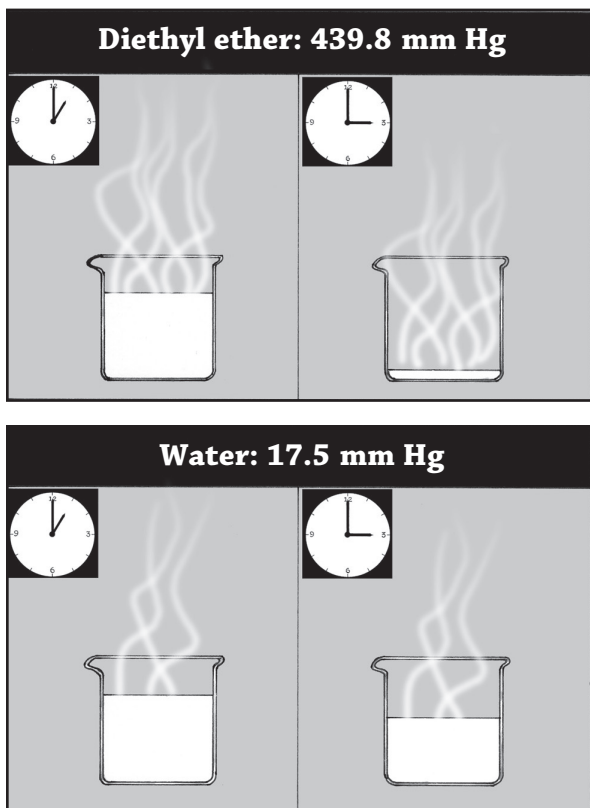


## VAPOUR PRESSURE

When a substance evaporates, its vapours exert pressure in the ambient environment. Vapour pressure is expressed in millimetres of mercury (mm Hg) or in kilopascals (kPa) at 20°C and normal atmospheric pressure of 760 mm Hg (101.32 kPa). A vapour pressure greater than 760 mm Hg (101.32 kPa) indicates that the substance is in the gaseous state. The higher a substance's vapour pressure, the more it tends to evaporate.

### **Example**

The vapour pressure of water is 17.5 mm Hg (2.33 kPa) and that of diethyl ether, 439.8 mm Hg (58.63 kPa). Therefore, diethyl ether evaporates faster than water.



### **CONCENTRATION AT SATURATION**

This is the maximum concentration that a substance can reach in the air at equilibrium, 20°C and normal atmospheric pressure of 760 mm Hg (101.32 kPa).

### **Example**

Toluene has a concentration at saturation of 28,800 ppm.

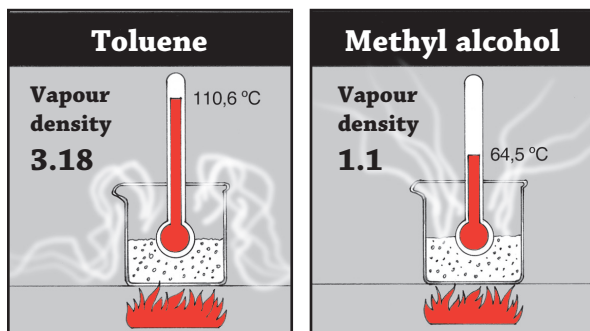
## VAPOUR DENSITY

This information indicates how many times the vapours of a substance are heavier or lighter than air (air = 1). This measurement is taken at the boiling point.

If the vapour density is greater than 1, a substance's vapours will tend to remain near the ground.

### Examples

- Toluene has a vapour density of 3.18. Therefore, at its boiling point, its vapours will tend to remain at the ground.
- Methyl alcohol has a vapour density of 1.1. Therefore at its boiling point, its vapours will mix easily with air, since its vapour density is close to 1.



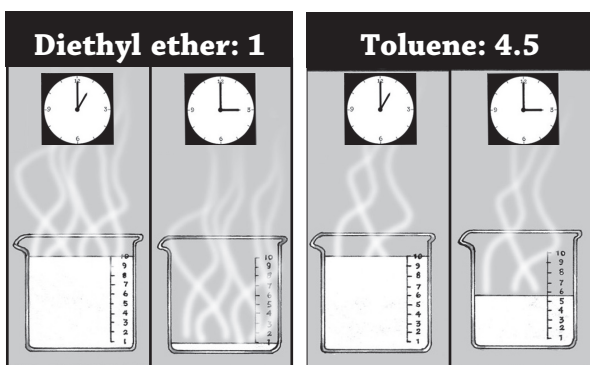
**Note.** – The behaviour of vapours is valid only for a rather short period of time and at a temperature close to the boiling point. The vapours given off by a boiling substance disperse into the air over time. The tendency of vapours to remain close to the ground decreases as the difference between the ambient temperature and the boiling point increases.

## EVAPORATION RATE

The evaporation rate indicates the relationship between the time that a product takes to evaporate and the time that a reference product takes to evaporate. It indicates, at equal volume, how many times longer a product takes to evaporate than another. The rate varies with the type of product and the temperature. Diethyl ether, for example, is the reference product on which the most data is available.

### *Example*

Toluene's evaporation rate is 4.5 in relation to that of diethyl ether. Therefore, toluene takes 4.5 times longer than diethyl ether to evaporate.



**Note.** – There are other reference products, such as n-butyl acetate, which are used to establish an evaporation rate. There are also other ways of establishing the evaporation rate. One of the methods used consists of determining, for the same period, the ratio of the volumes of the target product and reference product that evaporated. Another method consists of determining, for the same initial volume of liquid, the ratio of the percentages of the target product and reference product that evaporated. Unfortunately, sometimes a value is given without the method used being indicated.

## COEFFICIENT OF WATER/OIL DISTRIBUTION

This is the ratio of the solubility of a product in oil to its solubility in water when they are brought into contact with the product.

A value below 1 indicates a better solubility of the product in oils and greases. The product is therefore likely to be absorbed by the skin. However, a value greater than 1 indicates a better solubility in water. This product could therefore be absorbed by the mucous membranes. This information can be useful in evaluating the first aid to be given and can facilitate the choice of protective equipment.

### *Example*

Toluene has a coefficient of water/oil distribution of 0.0026. Therefore, toluene is more soluble in oil than in water with a value of 0.0026 g in water to 1 g in oil.

**Note.** – On some material safety data sheets, the distribution coefficient is expressed as log  $P_{ow}$ , therefore as the logarithm of the n-octanol/water partition coefficient. n-Octanol is in fact the reference substance that is closest to oil. The method for converting log  $P_{ow}$  into the coefficient of water/oil distribution is described in the *Conversion factors* section of this guide.

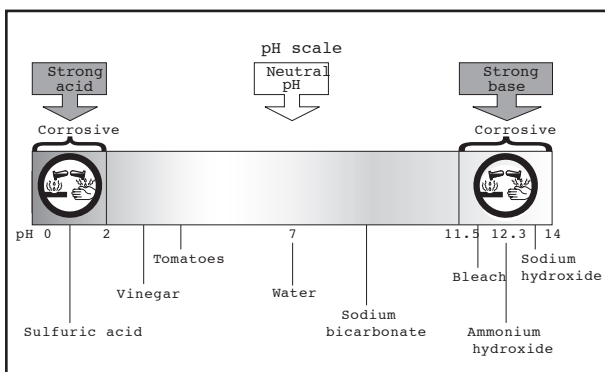
## pH

The pH, expressed as a numerical value, indicates whether a solution is acidic or basic. Water is neutral and has a pH of 7. Acids have a pH below 7, and the lower the value, the stronger the acid. Bases have a pH greater than 7, and the higher the value, the stronger the base.

### Examples

**Vinegar** (acid) : pH = 2.1

27-30% **Ammonium hydroxide** (base): pH = 12.3



**Note.** – For regulation purposes, particularly WHMIS, a substance is considered corrosive if its pH is equal to or less than 2 or equal to or greater than 11.5. However, tests carried out on animals that prove that the substance is not corrosive predominate over the pH value.

## SOLUBILITY IN WATER AT SATURATION

This is the maximum amount of a product that can be dissolved in water. It is expressed in grams per litre at a temperature of 20°C. If the solubility is not precisely known, the product is called, for example, “insoluble”, “slightly soluble” or “very soluble”. A liquid that mixes perfectly with water to form a single phase is called “miscible”.

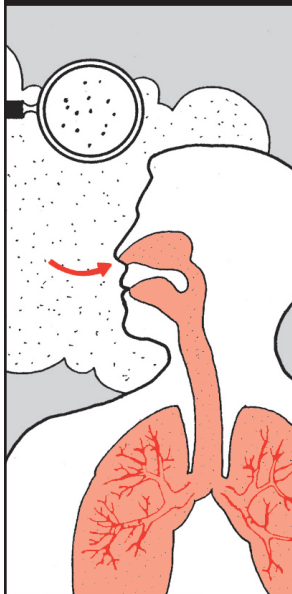
## PARTICLE SIZE

The particle size indicates the size of the particles forming a powder, a dust, a mist, an aerosol or fumes. Particles smaller than  $1\mu\text{m}^*$  can penetrate deeply into the respiratory tract and deposit in the alveoli. Slightly larger particles (from 1 to  $5\mu\text{m}$ ) reach the trachea, bronchi and bronchioles. Larger particles (from 5 to  $30\mu\text{m}$ ) reach the nose and pharynx region. Even larger particles (larger than  $30\mu\text{m}$ ) rarely penetrate the upper respiratory tract. Depending on the substance, they may dissolve and be absorbed by the body. Therefore, by knowing the size of the particles of a substance, one can decide on the corrective measures to adopt to reduce or eliminate the hazard at source (for example, by planning for local ventilation). If it is impossible to reduce or eliminate the hazard at source, knowledge of the particle size will make it easier to choose the respiratory protection device.

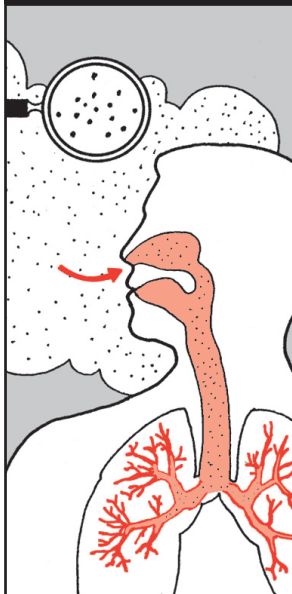
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\*  $1\mu\text{m}$  (micron) represents  $10^{-6}$  metres (0.000001 metre) or  $10^{-3}$  millimetres (0.001 mm). For example,  $1\mu\text{m}$  is approximately 1,000 times smaller than a grain of sand.

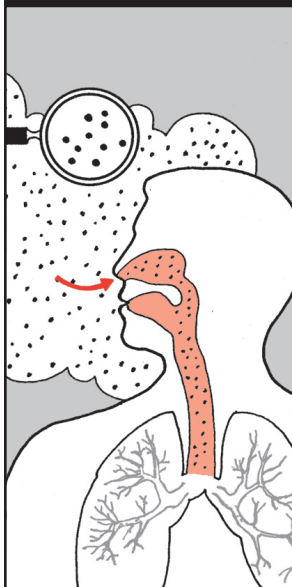
**Less than 1  $\mu\text{m}$**



**1 to 5  $\mu\text{m}$**



**5 to 30  $\mu\text{m}$**



**More than 30  $\mu\text{m}$**



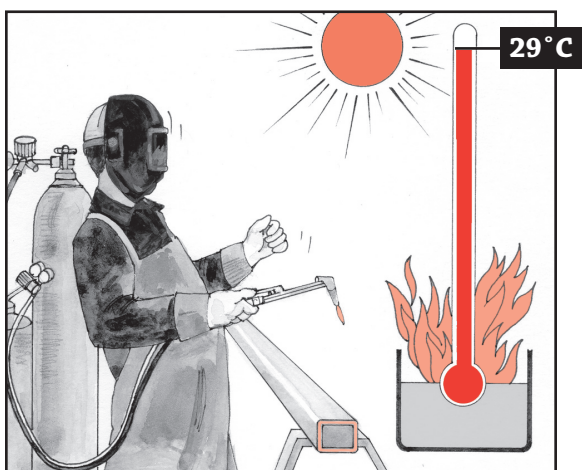
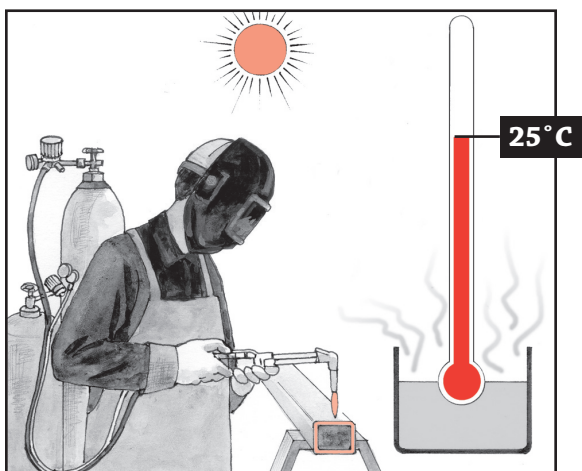
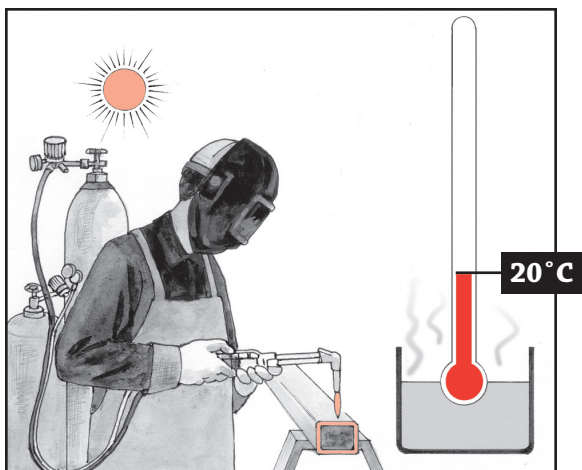
## FIRE OR EXPLOSION HAZARD

### FLASH POINT AND METHOD OF DETERMINATION

The flash point is the lowest temperature at which a substance gives off sufficient vapours to form a flammable mixture with the air on contact with a flame or spark. A product's flash point is determined by either of the two following methods: in a **closed cup**, meaning inside the container that contains it, or in an **open cup**, meaning near the surface of the liquid. The lower a liquid's flash point, the greater the risk of fire.

#### *Example*

Normal butanol has a flash point in a closed cup of 29°C (*Set-a-flash* method). It is therefore extremely flammable on a hot summer day when its vapours come in contact with a flame or spark.

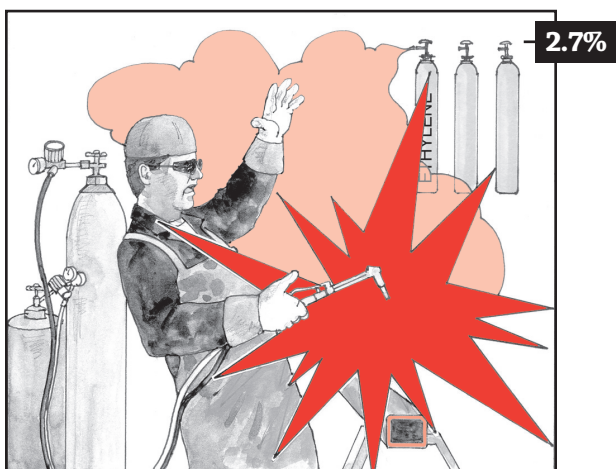
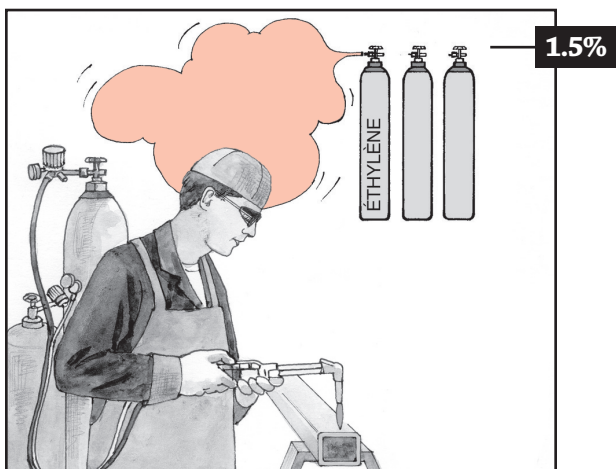
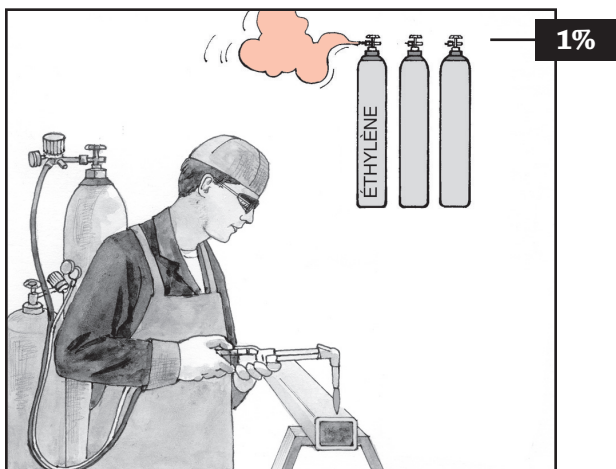


## **LOWER AND UPPER EXPLOSIVE OR FLAMMABLE LIMITS**

These are the minimum and maximum concentrations of a product in the air between which a flammable or explosive mixture can form in the presence of an ignition source. These concentrations are expressed as a percentage of the volume in the air.

### ***Example***

Ethylene has a lower explosive limit of 2.7% and an upper limit of 36%. Therefore, in the presence of an ignition source, if the concentration of the gas is less than 2.7% or greater than 36%, there is no risk of explosion. But if the concentration of the substance is between these two limits, the mixture could explode. The concentration of the product in the air must be kept under its lower explosive limit, for example by using appropriate ventilation.

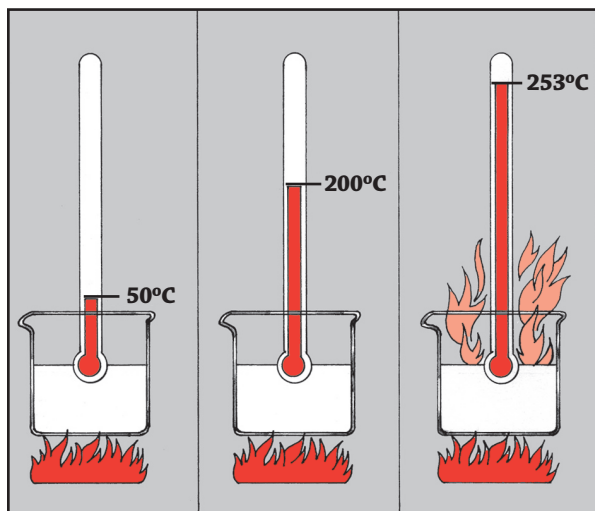


## AUTO-IGNITION TEMPERATURE

This is the lowest temperature at which spontaneous combustion of a product occurs. It begins to burn by itself in the absence of any flame or spark. The closer the auto-ignition temperature is to the ambient temperature, the greater the risk of fire.

### *Example*

Turpentine has an auto-ignition temperature of 253°C. Therefore, it will not burst into flame by itself at ambient temperature.



## CONDITIONS OF FLAMMABILITY

Conditions of flammability indicate whether a product could burst into flame and under what conditions.

### *Example*

Toluene is a flammable liquid and will therefore burst into flame if it is near a source of ignition.

**Note.** – When a substance is classified “flammable”, the necessary precautions must be taken to avoid it reaching its auto-ignition temperature or its flash point, depending on the case.

## **EXPLOSION CONDITIONS**

Explosion conditions indicate whether a product is likely or not to explode when it is used.

### ***Example***

Toluene vapours form an explosive mixture with air.

## **EXPLOSION DATA — SENSITIVITY TO MECHANICAL IMPACT**

These data indicate whether or not there is a risk of explosion on impact, and if so, specify under what conditions the explosion could occur.

### ***Example***

Picric acid may explode on impact.

## **EXPLOSION DATA — SENSITIVITY TO STATIC DISCHARGE**

These data indicate whether or not there is a risk of explosion with a static discharge, and if so, under what conditions explosion could occur.

### ***Example***

When xylene is shaken or when it flows in pipes, it can accumulate a static charge that may cause the vapours to ignite.

## MEANS OF EXTINCTION

This subsection contains a list of the extinguishing agents to use to fight a fire when this product is present or when it is the cause of the fire.

### *Example*

**Toluene** : Carbon dioxide, dry chemical, water spray, alcohol foam.

## SPECIAL PRECAUTIONS

This subsection describes the special precautions to take to fight a fire when this product is present or when it is the cause of the fire. Also indicated are the specific means for avoiding an explosion or the propagation of the fire.

### *Example*

**Toluene** : Wear a self-contained breathing apparatus. The vapours are heavier than air and can travel a great distance towards a source of ignition and thus cause flashback.

## HAZARDOUS COMBUSTION PRODUCTS

This subsection lists the combustion products that are health and safety hazards and that may form when the substance burns.

### *Example*

**Toluene** : Carbon dioxide, carbon monoxide.

## REACTIVITY DATA

### CONDITIONS OF CHEMICAL INSTABILITY

This information indicates whether a substance is stable and, if need be, indicates the conditions that produce chemical instability.

#### *Example*

Sodium hypochlorite gives off toxic fumes of chlorine when it is heated. Appropriate ventilation must be provided to ensure that the permissible limit values are not exceeded.



## NAME OR CLASS OF SUBSTANCES WITH WHICH THE PRODUCT IS INCOMPATIBLE

This subsection indicates whether a product must not be brought into contact with certain specified substances, and if need be, specifies the nature of the hazard if the product is brought into contact with these substances.

### *Example*

12% bleach is incompatible with strong acids. On



contact, it gives off toxic chlorine vapours.

## CONDITIONS OF REACTIVITY

This indicates whether a substance is likely to react violently or dangerously under normal conditions of use. If need be, the nature of the hazard is specified.

### *Example*

12% bleach is unstable in the presence of light and metals or when the pH of the solution becomes less basic.

## HAZARDOUS DECOMPOSITION PRODUCTS

This subsection lists the products that are health and safety hazards that are likely to form when a substance decomposes. Decomposition may be the result of a reaction occurring at room temperature, exposure to light, or the effect of heat on the substance, etc.

### *Example*

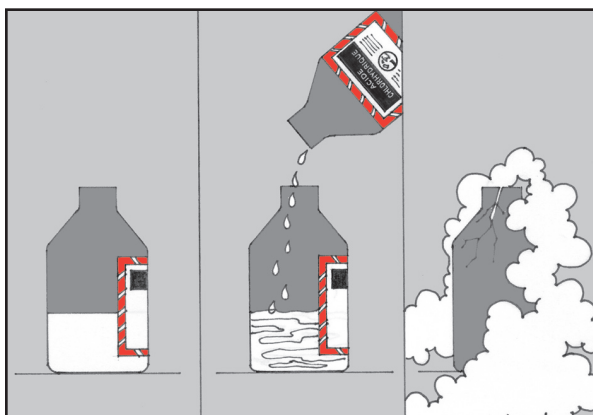
**Ammonia:** thermal decomposition (begins between 450°C and 500°C), giving off nitrogen and hydrogen.

## POLYMERIZATION

This subsection indicates whether the substance can change into a polymer (the combining of several molecules) and under what conditions this change occurs. The heat given off and/or the expansion in volume caused by the polymerization reaction could cause the container to burst and the remaining product (unpolymerized) to spill. These accidents can be avoided by controlling the polymerization conditions.

### *Example*

Exposure to light or contact with strong acids or bases can cause acrolein to polymerize.



## TOXICOLOGICAL PROPERTIES

### ROUTES OF ENTRY, SKIN AND EYE CONTACT

This section indicates the routes by which the substance can enter the body and produce harmful effects. These routes include the respiratory tract (inhalation), skin (cutaneous absorption) and the digestive tract (ingestion). Also included is any surface of the body on which the substance can produce a harmful effect by direct contact.

#### *Examples*

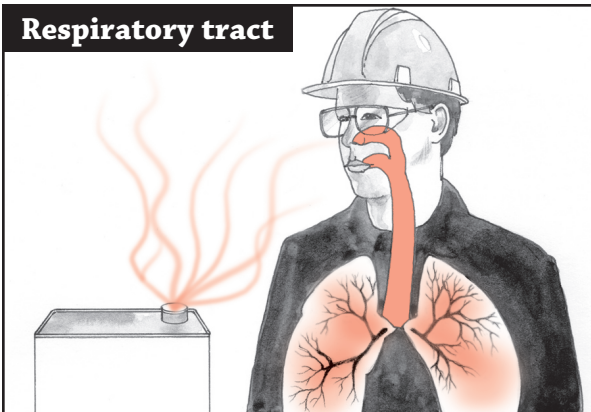
##### **Routes of entry**

**Toluene** : The substance is absorbed through the respiratory tract, skin and digestive tract.

##### **Skin and eye contact**

**Sulfuric acid** : Following direct contact with the skin and eyes, this product may cause burns.

## Respiratory tract



## Digestive tract



## Skin

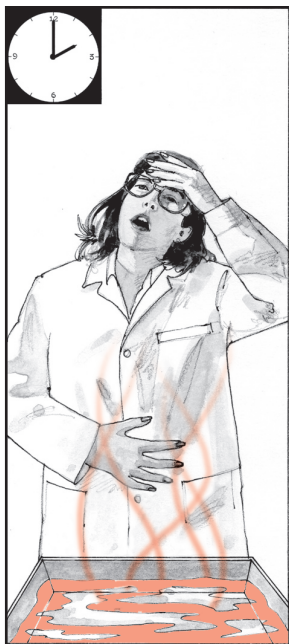


## **EFFECTS OF ACUTE EXPOSURE TO PRODUCT**

These health hazards result from short-term exposure to the controlled product. Acute exposure is generally defined as a single or repeated exposure over a 24-hour period. Often, acute poisoning produces brief and reversible toxic effects. However, some effects may show up only several hours after intoxication. Also, some serious poisonings may produce sequelae.

### ***Example***

Exposure to high concentrations of acetone vapours (above 12,000 ppm) may cause dryness of the mouth and throat, salivation, anorexia, headache, nausea, vomiting, dizziness, incoordination, asthenia, lethargy and ataxia. In extreme cases, it can lead to stupor or coma.

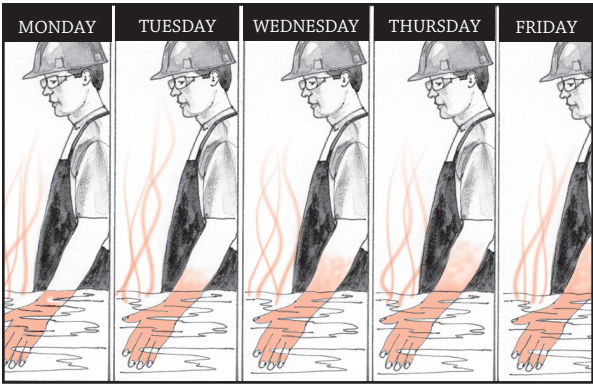


## **EFFECTS OF CHRONIC EXPOSURE TO PRODUCT**

These health hazards result from prolonged exposure to the controlled product at concentrations lower than those that produce acute effects. The duration of the exposure can vary (weeks, months, years).

### ***Example***

The repeated inhalation of styrene vapour may cause nervous system disorders that first appear as headache, nausea, dizziness, a loss of appetite, and general weakness. The following effects may subsequently be observed: increased reaction time, difficulty with colour perception, etc. Repeated skin contact with the product may cause redness, desquamation and cracking of the skin.

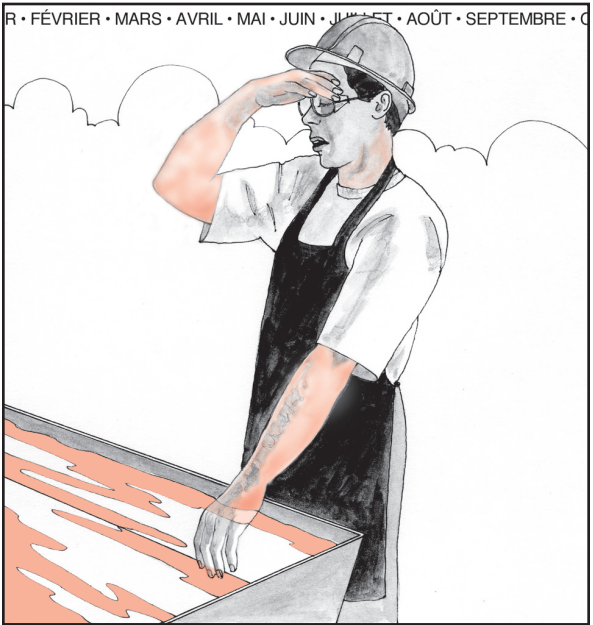


1<sup>st</sup> WEEK

2<sup>nd</sup> WEEK

3<sup>rd</sup> WEEK

4<sup>th</sup> WEEK



## EXPOSURE LIMITS

Exposure limits are the concentrations permitted in the air for a given substance. They represent the concentrations of the substance in the air to which the great majority of workers can be exposed daily, without suffering harmful effects. There are three types of values:

- Short-term exposure values, which are measured for a maximum duration of 15 minutes;
- Time-weighted average exposure values, which are measured for the duration of an 8-hour work shift;
- Ceiling values, which must never be exceeded for any period of time whatsoever.

On the material safety data sheet, the permissible limit values in Québec, which are specified by the *Regulation respecting occupational health and safety* (S-2.1, R.19), are sometimes presented. For more details, consult the *Regulations (ROHS)* section of this guide. However, the limit values recommended by the ACGIH® (*American Conference of Governmental Industrial Hygienists*), an American organization, are often the ones that appear on the MSDS. Exposure limit values are given in ppm, in mg/m<sup>3</sup> or in fibres/cm<sup>3</sup>.

If a product consists of several ingredients, the exposure limit for each of the ingredients must be indicated on the MSDS.

## IRRITANCY AND CORROSIVENESS

This subsection indicates whether the substance may cause irritation of the eyes, skin or mucous membranes of the respiratory and digestive tracts.

A substance's irritating effects on the eyes or skin may be, for example, a minor tingling sensation to erythema (redness) or edema (swelling). This damage is **reversible**, meaning that it disappears with time, when exposure to the product stops. If the damage caused by a substance is **IRREVERSIBLE**, the substance is said to be corrosive.

### *Examples*

Isopropyl alcohol is moderately irritating to the eyes and slightly or not irritating to the skin. Exposure to vapours of this substance may cause irritation of the eyes and upper respiratory tract.

Sodium hydroxide is a corrosive product that may cause serious burns accompanied by deep ulceration of the skin. On the eyes, it causes disintegration and escharification of the conjunctiva and cornea accompanied by edema and ulceration. Permanent opacification of the cornea is also possible. Exposure to dusts or mists may cause irritation and ulceration of the nasal passages. Pulmonary edema may occur with exposures to high concentrations of dusts or mists.

## **SENSITIZATION TO PRODUCT**

Sensitization is an immune reaction of the body. It occurs following exposure to a chemical or biological substance and produces an allergic response of the respiratory tract (rhinitis, asthma) or skin (eczema). Exposure to the sensitizing substance may have previously produced no symptoms, until an initial allergic response occurs.

### ***Examples***

After an initial contact with isocyanates (TDI, HDI, MDI, etc.), subsequent contact may produce sensitization of the respiratory tract (asthma) in some people.

Formaldehyde (used as a preservative in various types of products such as cutting oils) is a skin sensitizer.

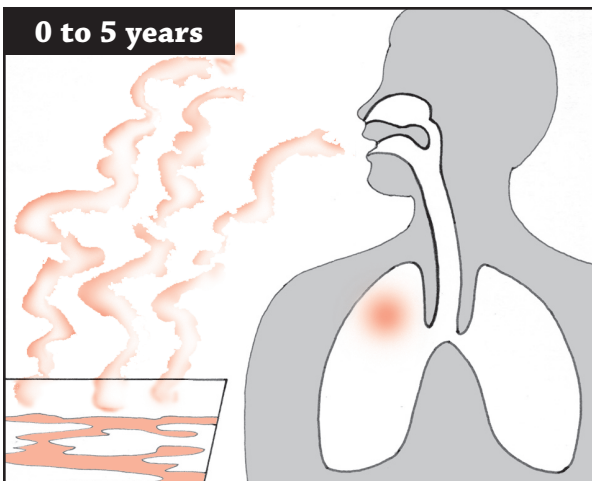
## **CARCINOGENICITY**

This subsection specifies whether the substance can cause cancer or not. WHMIS uses the IARC (*International Agency for Research on Cancer*) and ACGIH® (*American Conference of Governmental Industrial Hygienists*) classifications to determine a substance's carcinogenic potential. A substance classified A1 and A2 by the ACGIH, or group 1, 2A and 2B by IARC, is recognized as carcinogenic by WHMIS. Substances can be listed as proven, probable or possible carcinogens, depending on the evidence observed.

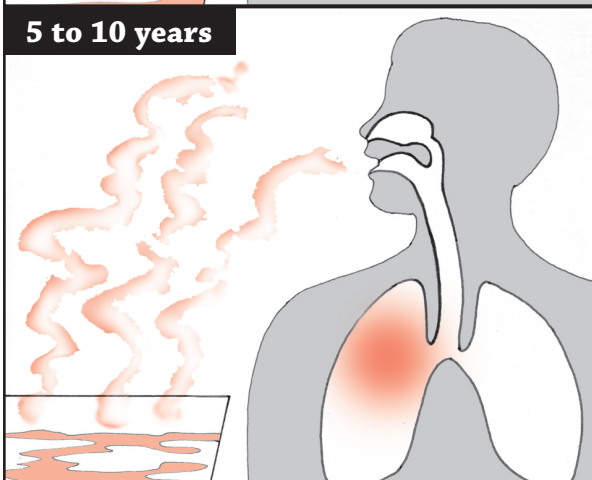
### ***Example***

The *International Agency for Research on Cancer* (IARC) considers styrene as a possible human carcinogen (group 2B).

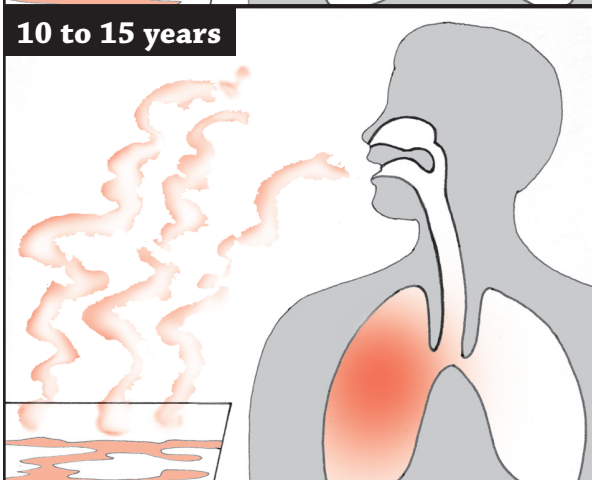
**0 to 5 years**



**5 to 10 years**



**10 to 15 years**



## REPRODUCTIVE TOXICITY

Some substances can have toxic effects on reproduction, meaning that they can cause a change in fertility, thus affecting a woman's or a man's reproductive capability. For example, some substances may affect hormonal activity, spermatogenesis, etc., which may affect fertility.

### *Example*

Carbon disulfide may cause sperm disorders as well as menstrual disorders in humans.

## TERATOGENICITY

This section states whether the substance can cause malformations in newborns. The *Controlled Products Regulations* require that all effects on development be mentioned, and therefore embryotoxic and fetotoxic effects (effects other than malformations) must appear on the MSDS. These may include, for example, a reduction in body weight, growth retardation, dysfunction, death, etc. Effects on post-natal development (after birth) are also indicated. Most of the time, the information comes from animal studies.

***Example***

Toluene has an embryotoxic and/or fetotoxic effect on animals.

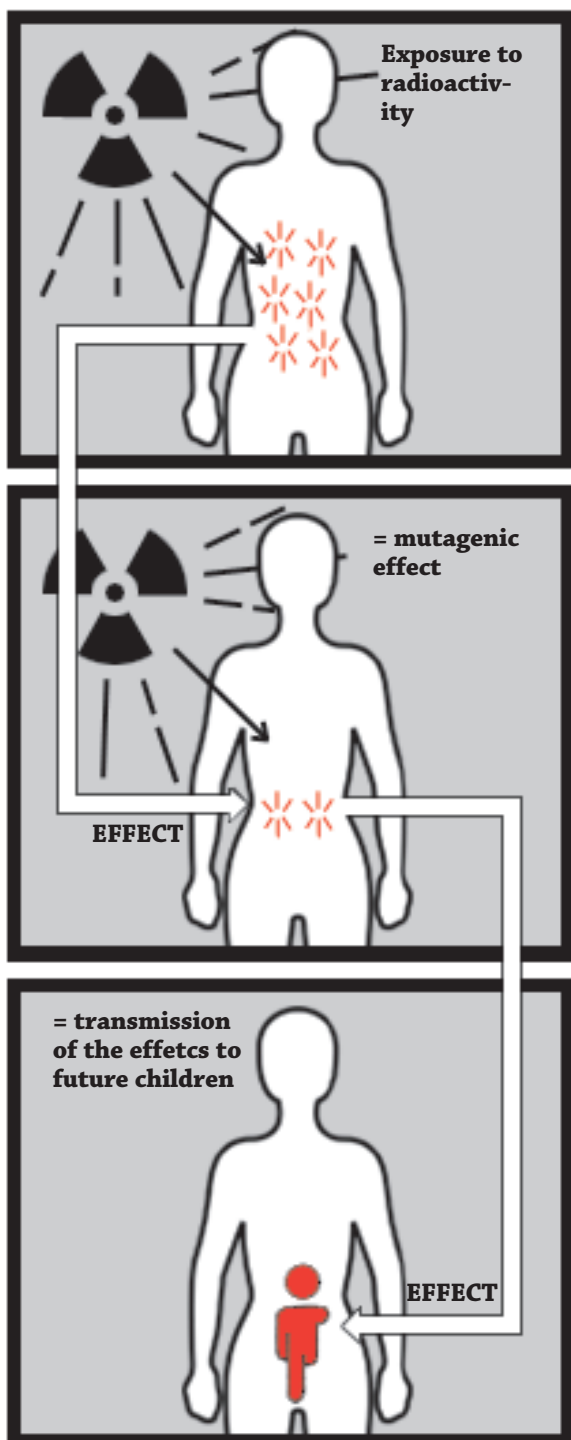


## **MUTAGENICITY**

This subsection indicates whether the substance may cause mutations (changes) in the genetic material (DNA) of cells. Mutations in the DNA of reproductive or germ cells (eggs or sperm) may cause hereditary effects, meaning that they are transmissible to offspring. Effects on other cells (nonreproductive or somatic cells) do not cause hereditary effects, but may lead to cell death, the transmission of the mutation to cells of the same tissue, or cancer.

### ***Example***

Benzene is a human mutagen.



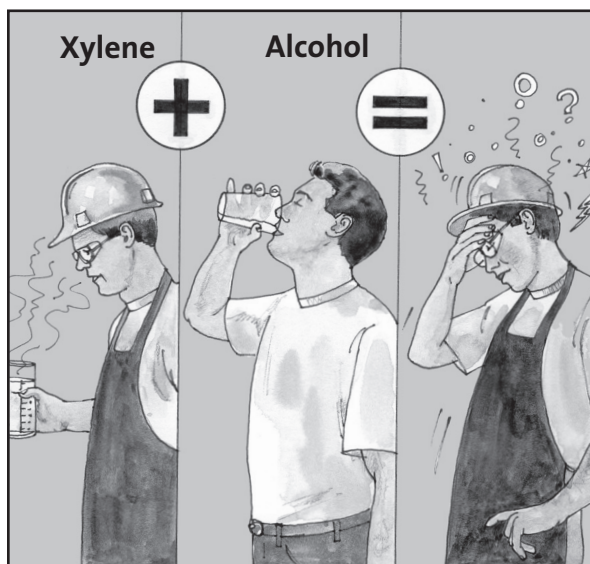
## NAMES OF TOXICOLOGICALLY SYNERGISTIC PRODUCTS

These are substances or products that interact with the controlled product to produce a toxic effect greater than the sum of their individual effects.

There are other types of interactions between chemical products, namely antagonism (reduced toxic effects), the additive effect (effects that are added), etc. However, the *Controlled Products Regulations* do not require that these effects be mentioned on the MSDS.

### **Example**

The duration of xylene's toxic effects increases with the consumption of alcohol or aspirin.



## PREVENTIVE MEASURES

This section contains useful information for protecting the health and physical well-being of a worker exposed to the product under normal or accidental conditions of use, handling, or storage of this product.

### PROTECTIVE EQUIPMENT TO BE USED

This subsection specifies the parts of the body to be protected and the type of protective equipment appropriate to the contaminant exposure and the regulations in force in Québec. For more information on the respiratory protective equipment to use in Québec, consult the following Web site: [www.prot.resp.csst.qc.ca](http://www.prot.resp.csst.qc.ca).

#### *Example*

#### **Xylene**

#### **Respiratory tract**

From 100 ppm, wear an appropriate respirator.

#### **Skin**

Gloves: Multilayer polyethylene/ethylene vinyl alcohol/polyethylene (PE/EVAL/PE), polyvinyl alcohol (PVAL), multilayer Viton®/butyl rubber/Viton® or Viton®.

#### **Eyes**

Wear safety glasses if there is a risk of splashing.



## ENGINEERING CONTROLS TO BE USED

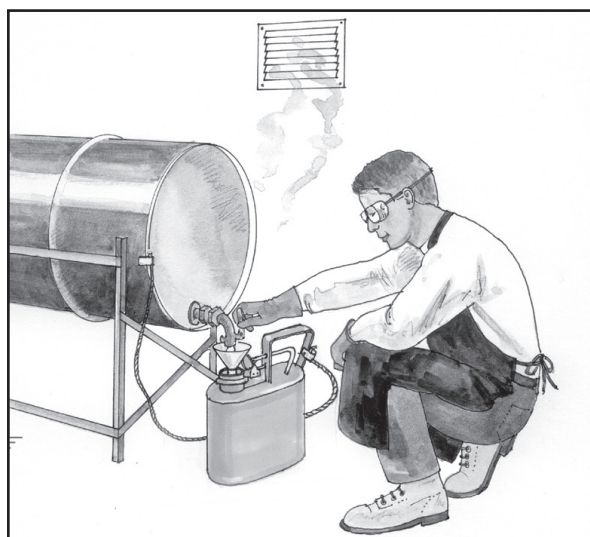
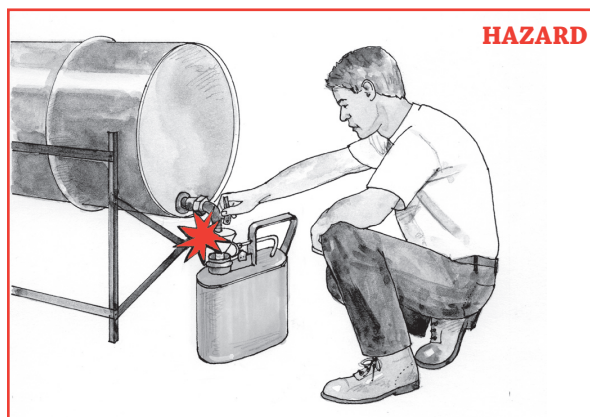
This subsection contains the specific procedures to apply to handle the product safely.

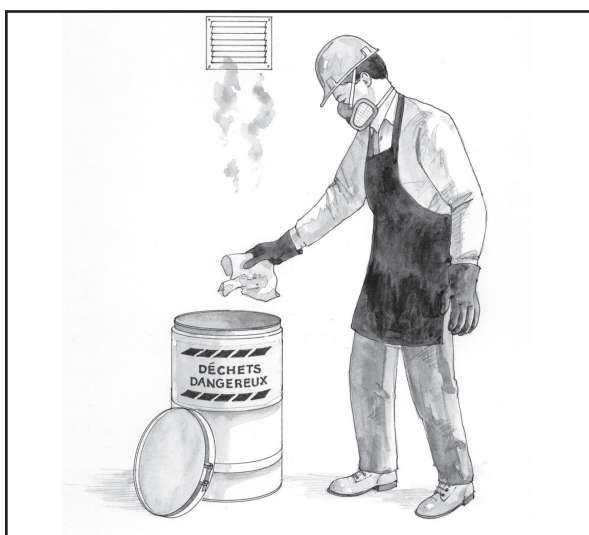
### *Example*

#### **Xylene**

This flammable liquid must be handled in compliance with the *Flammable and Combustible Liquids Code* NFPA 30. Use tools that will not produce sparks.

Wear the appropriate protective clothing and ventilate adequately. Equipment must be grounded and bonded: refer to NFPA 77 code.





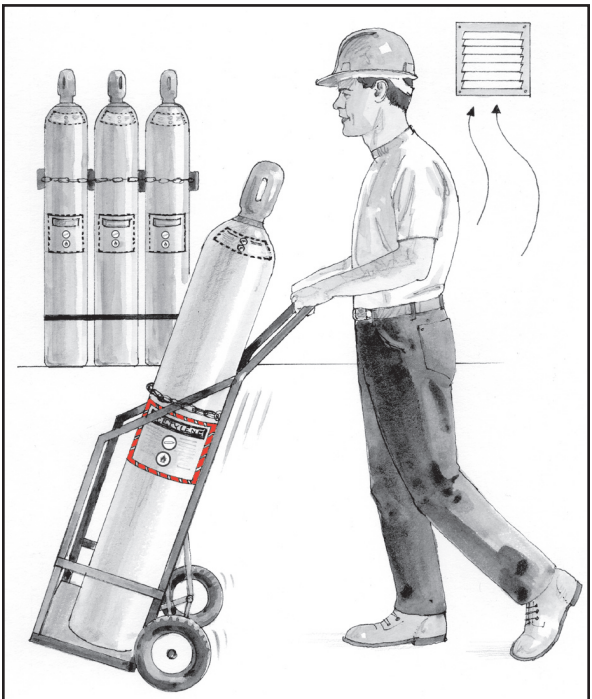
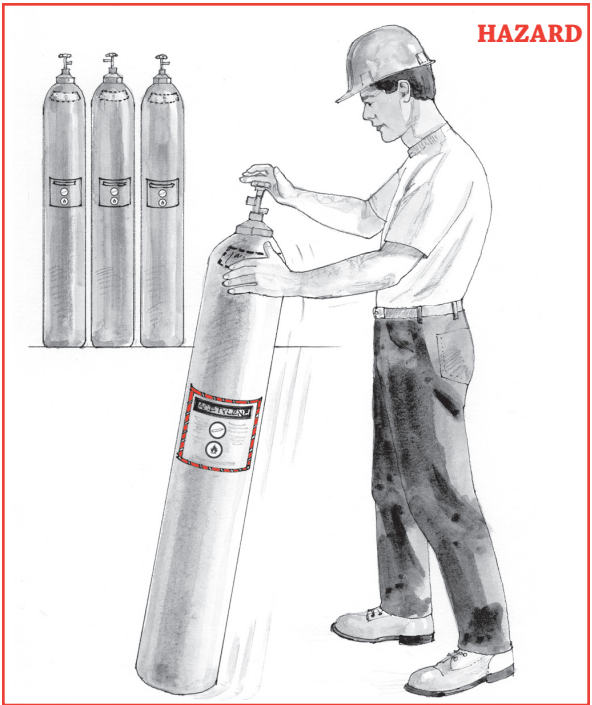
## PROCEDURES TO BE FOLLOWED IN CASE OF LEAK OR SPILL

This subsection contains procedures to apply in the event of accidental leaks or spills of the product as well as the means of disposing of it.

### *Example*

#### **Toluene**

In the event of accidental leaks or minor spills, absorb with sand or any other non-combustible absorbent material. Place the mixture in a well-identified airtight container so that it can be treated later in compliance with the regulations in force.



## **WASTE DISPOSAL**

The steps to be taken for product waste disposal are explained in this subsection.

### ***Example***

#### **Xylene**

Ventilate the site of the spill well so that the remainder of the liquid evaporates and the vapours disperse. Do not pour the waste into the sewer and do not dispose of contaminated absorbents in the garbage. If necessary, consult the regional office of the ministère de l'Environnement. Dispose of it in compliance with the municipal, provincial and federal regulations in effect.

## **HANDLING PROCEDURES AND EQUIPMENT**

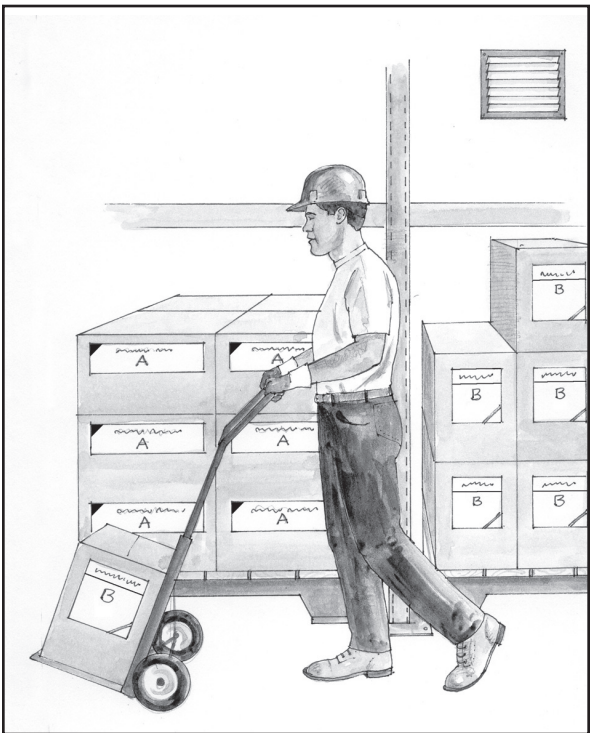
Consult the *Handling* subsection to learn how to handle the product safely.

### ***Example***

#### **Acetylene**

Compressed gas cylinders must not be subjected to violent impact, and a damaged cylinder must never be used. Do not use cylinders of compressed gas for purposes other than those for which they are intended. They must be attached upright or secured in a cart when they are used. Handle them away from all sources of heat and ignition. Use tools that will not produce sparks. Equipment must be grounded.

**HAZARD**



## STORAGE REQUIREMENTS

The *Storage* subsection contains the conditions for safe storage of the product.

### *Example*

#### **Xylene**

Store it in a cool and well-ventilated location, away from sources of heat and ignition and incompatible substances. The containers must be grounded.

## SPECIAL SHIPPING INFORMATION

The **Shipping** subsection contains the special information relating to the shipping of dangerous goods. For more details, consult the *Regulations* section (*TDG*) of this guide.

## FIRST AID MEASURES

This section of the MSDS describes the first aid to be given in the event of poisoning or accidental contact with the product.

### *Example*

#### **Styrene**

##### **Inhalation**

In the event of inhalation of vapours, take the person to a ventilated location. If the person is not breathing, perform artificial respiration. Call a physician.

##### **Eye contact**

Rinse the eyes with plenty of water for 15 to 20 minutes. If the irritation persists, consult a physician.

##### **Skin contact**

Rapidly remove contaminated clothing. Wash skin with soap and water.

##### **Ingestion**

In the event of ingestion, rinse the mouth with water. If there are unusual symptoms, consult a physician.

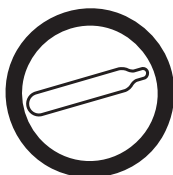
# REGULATIONS

## WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (WHMIS)

In Québec, the CSST is responsible for applying WHMIS according to the *Regulation respecting information on controlled products* (Québec regulation), the *Controlled Products Regulations* (federal regulation) and the *Hazardous Products Act*.

WHMIS divides hazardous materials into six main classes. These classes are based on the hazard criteria listed in the *Controlled Products Regulations*. A controlled product is a substance that meets one or more classification criteria. This classification can be based on the data inherent in the material or data on its ingredients.

### CLASSES



A: Compressed gas



B1: Flammable gases  
B2: Flammable liquids  
B3: Combustible liquids  
B4: Flammable solids  
B5: Flammable aerosols  
B6: Reactive flammable materials



C: Oxidizing material



D1A: Very toxic material  
causing immediate and  
serious effects

D1B: Toxic material causing  
immediate and serious  
effects



D2A: Very toxic material  
causing other effects

D2B: Toxic material causing  
other effects



D3: Biohazardous infectious  
material



E: Corrosive material



F: Dangerously reactive  
material

## DISCLOSURE LIST

This list specifies whether a substance is or is not on the disclosure list of regulated ingredients according to the *Hazardous Products Act* and the cut-off concentration at or above which it must be disclosed (namely 0.1% or 1.0%).

### **Example**

Ammonia must be disclosed if its concentration in a mixture is equal to or greater than 1.0% (W/W).

## REGULATION RESPECTING OCCUPATIONAL HEALTH AND SAFETY (ROHS)

In Québec, the permissible exposure values for air contaminants are those prescribed by the *Regulation respecting occupational health and safety* (S2.1, R.19), extracts of which are presented below.

The **time-weighted average exposure value (TWAEV)** “is the time-weighted average concentration for an 8-hour workday and a 40-hour workweek of a chemical substance (in the form of gases, dusts, fumes, vapours or mists) present in the air in a worker’s respiratory zone.”

“For any work period equal to or longer than 4 hours but less than 8 hours or a period in excess of 8 hours but less than or equal to 16 hours, an **adjusted average exposure value (AAEV)** must be established in accordance with the *Guide to the adjustment of permissible exposure values for unusual work schedules*, published by the Institut de recherche Robert-Sauvé en santé et en sécurité du travail ([www.irsst.qc.ca](http://www.irsst.qc.ca)), as it reads at the time it is applied. Under no circumstance may the AAEV be higher than the TWAEV.”

The **short-term exposure value (STEV)** “is the 15-minute time-weighted average concentration for exposure to a chemical substance (in the form of gases, dusts, fumes, vapours or mists), present in the air in a worker’s respiratory zone which should not be exceeded at any time during a workday, even if the time-weighted average exposure value is not exceeded. The average exposure for a 15-minute consecutive period may be included between the TWAEV and the STEV, insofar as such exposures are not repeated more than 4 times a day and have intervals between them of periods of at least 60 minutes.”

The **ceiling value** “is the concentration never to be exceeded during any length of time whatsoever.”

The regulation also includes **designations and remarks**: Pc (percutaneous), EM (exposure reduced to a minimum), RP (recirculation prohibited), S (sensitization) and the carcinogen designations.

For more details, consult Schedule 1 of the *Regulation respecting occupational health and safety*.

## TRANSPORTATION OF DANGEROUS GOODS (TDG)

In Québec, the TDG is regulated by the *Transportation of Dangerous Substances Regulation* of the ministère des Transports of Québec. It was adopted in compliance with the *Transportation of Dangerous Goods Regulations* of Transport Canada, in application of the *Transportation of Dangerous Goods Act*.

### DEFINITIONS

**PIN (UN)** : Product Identification Number. Numeric or alphanumeric designation used to identify a substance or a group of substances with the same name as dangerous goods in the regulation.

**Class** : numeric data used to designate a substance according to the characteristics of the hazard. In the *Transportation of Dangerous Goods Act*, products are divided into nine classes. A substance can be assigned more than one class, with the primary class (describing the main hazard) and the subsidiary class or classes also indicated.

**Packing group or risk group** : numerical designation in Roman or Arabic numerals used to indicate, as applicable, the hazard or risk level of goods.

**Special provisions :** numerical designation referring to a section of Schedule 2 of the *Transportation of Dangerous Goods Regulations* and defining, as applicable, the special measures applying to the means of containment, handling, offering for transport or transportation of a dangerous good.

**Explosive limit and limited quantity index :** number indicating the maximum amount of the hazardous good that may be handled or transported, or whose transport can be requested.

**ERAP index :** number indicating the maximum amounts related to ERAP (Emergency Response Assistance Plans), beyond which the dangerous goods are subject to the provisions of ERAP.

**Passenger-carrying ship index :** number indicating “the maximum quantity of dangerous goods per consignment that can be carried in a passenger carrying ship”.

**Passenger-carrying road vehicle or passenger-carrying railway vehicle index :** number indicating “the maximum quantity of dangerous goods that can be transported per consignment on a passenger carrying road vehicle or a passenger carrying railway vehicle”.

**Marine pollutant :** notation classifying a dangerous good as “P” (marine pollutant), as “PP” (severe marine pollutant) or “.” (potential marine pollutant).

# GLOSSARY

## A **AAEV**

Adjusted average exposure value according to the *Guide to the adjustment of permissible exposure values for unusual work schedules*, published by the Institut de recherche Robert-Sauvé en santé et en sécurité du travail.

## **Absorption**

Passing of a substance from outside to inside the body. Absorption pathways are routes by which a substance enters the body without injury. The usual routes in the workplace are the respiratory tract (by inhalation) and skin (cutaneous penetration). The digestive tract (ingestion) is the least common.

## **ACGIH®**

*American Conference of Governmental Industrial Hygienists*. Non-governmental American organization of industrial hygienists from governmental agencies. The ACGIH® develops and publishes recommended exposure standards for chemicals and physical agents as well as a list of biological exposure indices.

## **Acid**

A chemical substance that can release a hydrogen ion ( $H^+$ ). Acidity is measured in pH units from 0 to 7, where 7 is neutral and 0 very acid. According to WHMIS, a substance is a corrosive material if its pH is equal to or less than 2, when precise data are lacking.

## **Active (or reactive) metals**

Metals that react easily and rapidly with water, acids or alkalis (examples: sodium, aluminum and zinc).

## **Alkalis**

Carbonates, hydroxides, silicates, etc., of alkali metals (examples: sodium hydroxide, potassium hydroxide, etc.). Alkalis are basic and often corrosive substances.

**Alopecia**

Total or partial loss of hair, usually temporary.

**Anemia**

Reduction in the number of red blood cells or the amount of hemoglobin per unit volume of blood.

**Anhydrous**

Environment that does not contain any water, as opposed to humid, or a substance that does not contain water, as opposed to hydrated.

**Anorexia**

Reduction or loss of appetite.

**Anoxia**

Reduction in the amount of oxygen carried by the blood into the tissues.

**Anuria**

Absence of urine in the bladder.

**Apathy**

Absence of feeling with indifference to outside stimuli.

**Apnea**

Transient cessation of breathing.

**Argyria**

Poisoning by silver and its salts.

**Arrhythmia**

Disturbance in the heart rate.

**Asphyxia**

Difficult breathing or respiratory arrest.

**Asthenia**

Reduction or loss of strength (physical and psychic).

**Asthma**

Respiratory illness caused by an inflammatory reaction of the bronchi with symptoms such as difficult breathing, cough and wheezing.

**Ataxia**

Incoordination of movements.

**Atrophy**

Reduction in the weight and volume of an organ, tissue or cells.

## **B Base**

A chemical substance that can release a hydroxide ion ( $\text{OH}^-$ ). Basicity is measured in pH units from 7 to 14, where 7 is neutral and 14 very basic. According to WHMIS, a substance is a corrosive material if its pH is equal to or greater than 11.5, when precise data are lacking.

### **Biological exposure indices (BEI®)**

Numerical value used to evaluate the amount of a substance absorbed by the body. The substance or one of its metabolites is measured in a tissue, a biological liquid or in the expired air. This designation is published by the ACGIH®. The French equivalent is IBE (*Indices biologiques d'exposition*).

### **Biological monitoring**

Periodic monitoring of one or more biological media (blood, urine, etc.) in order to determine the absorption of a contaminant following exposure.

### **Blindness**

Loss of sight.

### **Blood lead concentration**

Amount of lead in the blood.

### **Bond, To**

To connect all conductive components in an electrical installation together.

### **Bradycardia**

Slowing of the heart rate.

### **Bronchitis**

Inflammation of the bronchi.

### **Bronchoconstriction**

Contraction with narrowing of the bronchi.

### **Bronchospasm**

Spasmodic contraction of the muscles surrounding the bronchi.

### **Byssinosis**

Pulmonary disorder due to the chronic inhalation of cotton dust.

## **C** **Carcinogenic (Effect)**

Indicates that the product may cause cancer.

### **CAS number**

Number assigned by the *Chemical Abstracts Service*, a division of the *American Chemical Society*, to identify a chemical substance. It is recognized by the characteristic presence of two dashes always located at the same place. Example: 12345-67-8.

### **Central nervous system (CNS)**

System consisting of the brain and spinal column. The effects of contaminants on the CNS can be the following: headache, nausea, vomiting, dizziness, incoordination, drowsiness, anesthesia, convulsions, etc.

### **Cephalgia**

Headache.

### **Characteristics of an exposure**

Defines or characterizes the exposure to a substance by establishing relationships between the product's physical properties or between them and the data used in industrial hygiene.

### **Chlorhydrate**

Chemical substance with at least one amine group, which combines with hydrogen chloride in a well-defined proportion (for example, hydroxylamine chlorhydrate).

### **Cholinesterase**

Enzyme present in the blood (causes the hydrolysis of choline esters).

### **CIRC**

#### **Centre international de recherche sur le cancer.**

CIRC evaluates and publishes information on the carcinogenicity of various products. The English equivalent is IARC (*International Agency for Research on Cancer*).

### **Cirrhosis**

Chronic progressive disease affecting the liver's structure and function.

**Collapse**

Rapid reduction in strength or the collapse of an organ, which may result in shock.

**Combustion products**

Contaminants originating from the complete combustion of the product in air. Their nature and quantity depend greatly on the temperature and amount of air (oxygen). For example, fire could produce substances very different from those that are given off when the substance is handled at high temperatures (thermal decomposition products).

**Congestion**

Abnormal accumulation of blood in the vessels of a tissue, organ or part of the body.

**Conjunctivitis**

Inflammation of the conjunctiva (mucous membrane covering the eye).

**Convulsions**

Violent involuntary muscle contractions.

**Corrosion**

Destruction of biological tissue (skin, cornea, etc.) or materials. When precise data are lacking, according to WHMIS, a substance is a corrosive material if its pH is equal to or less than 2 or equal to or greater than 11.5.

**Cutaneous**

Related to the skin.

**Cyanosis**

Bluish coloration of the skin and mucous membranes produced by a lack of oxygen.

**D Degeneration**

Abnormal change in an organ, a tissue or faculty, leading to a change in its functioning, but not always permanent.

**Deliquescent**

Substance that absorbs moisture from the air to the point of becoming liquid.

**Dental erosion**

Surface erosion of the teeth.

**Dermatitis**

Inflammation of the skin.

**Dermatosis**

Generic name for all skin disorders.

**Desquamation**

Abnormal shedding of the surface layers of the skin in small flakes.

**Development (Effects on)**

Indicates that the substance may have effects during prenatal development (before birth) and/or postnatal development (after birth until puberty). These effects include malformations (teratogenic effect), effects that may affect the embryo or the fetus (retarded growth, reduction in body weight, death, etc.) as well as postnatal effects (behavioural disorders, etc.).

**DNA**

Deoxyribonucleic acid (DNA) is a macromolecule (giant molecule) in the form of two complementary strands wrapped around each other in a double helix. DNA is the main component of chromosomes, and therefore the carrier of genetic material.

**Diuretic**

Increases the urinary output.

**DIVS**

*Danger immédiat pour la vie ou la santé.* This is the maximum concentration of a product present in an environment from which an individual can escape in a 30-minute period, without having symptoms that prevent him from escaping and without suffering irreversible health effects. This concentration has been defined in order to be able to choose an appropriate respiratory protective device. (This designation is published by NIOSH, *National Institute for Occupational Safety and Health*; the English acronym is IDLH: Immediately Dangerous to Life or Health.

**Dysarthria**

Difficulty articulating words.

**Dysphagia**

Difficulty swallowing.

**Dysphonia**

Change in voice.

**Dyspnea**

Difficulty breathing.

**Dysuria**

Difficulty urinating.

**E Edema**

Diffuse swelling caused by infiltration of liquid into the tissues.

**Embryo**

Product of conception from the fertilized egg to the end of the third month of pregnancy. The embryo stage precedes the fetal stage.

**Embryotoxic**

Toxic effect on the embryo.

**Encephalopathy**

Disease affecting the brain in general.

**Epigastric**

The region located between the ribs and the sternum above, the sides of the abdomen, and the umbilical region below.

**Epithelium**

Tissue that covers the external surfaces (skin, mucous membrane of natural orifices) and inside surfaces of the body (digestive tract, glands).

**Erythema**

Redness of the skin due to dilation of the capillaries.

**Eschar, escharification**

Necrosis of a skin tissue or mucous membrane, forming a blackish crust.

**Euphoria**

Intense feeling of well-being.

**Expectoration**

Expulsion by the mouth of secretions from the respiratory tract (sputum).

**Fasciculation**

Isolated, involuntary and uncontrollable contraction of a group of muscle fibres (never resulting in movement).

**Flatulence**

Accumulation of gas in the digestive tract.

**Fluorosis**

Characteristic chronic poisoning caused by fluorine and its derivatives.

**Fetotoxic**

Toxic effect on the fetus.

**Fetus**

Product of conception from the end of the third month of pregnancy to the end of intrauterine life. The fetal stage follows the embryonic stage.

**G Gastroenteritis**

Simultaneous inflammation of the mucous membrane of the stomach and small intestine.

**Gene**

Heredity-carrying material located on the chromosomes inside the nucleus.

**Granuloma**

Small benign nodular inflammatory tumour.

**Ground, To**

To connect all conductive components in an electrical installation to the ground.

**H Hematemesis**

The vomiting of blood.

**Hematoma**

Localized accumulation of blood in a tissue.

**Hematopoietic system**

System responsible for the formation of blood cells (includes the bone marrow and the lymphatic organs).

**Hematuria**

Presence of blood in the urine.

**Hemoglobinuria**

Presence of hemoglobin in the urine.

**Hemolysis**

Destruction of red blood cells, releasing hemoglobin.

**Hemorrhage**

Loss of blood.

**Hepatomegaly**

Enlargement of the liver.

**Hepatotoxic**

Toxic to the liver.

**Hydrate**

Chemical substance combined with water in a well-defined proportion. The adjective can be preceded by the prefixes mono-, di-, tri-, etc. (example: calcium sulfate dihydrate).

**Hydrolysis**

Chemical reaction (fragmentation) of a substance into several other smaller substances by the chemical addition of water. Occurs in an aqueous environment, which can induce the formation of new substances.

**Hygroscopic**

Substance that tends to absorb moisture from the air.

**Hyperemia**

See the definition of congestion.

**Hyperpigmentation**

Excessive skin pigmentation.

**Hyperplasia**

Increase in the number of normal cells.

**Hyperreflexia**

Exaggeration of reflexes.

**Hypertension**

High blood pressure.

**Hypotension**

Low blood pressure.

**Hypothermia**

Lowering of body temperature below normal (37°C).

## **IARC**

*International Agency for Research on Cancer*. IARC evaluates and publishes information on the carcinogenicity of various products. The French equivalent is CIRC (*Centre international de recherche sur le cancer*).

## **Icterus (jaundice)**

Yellow coloration of the skin and mucous membranes.

## **IDLH**

Immediately Dangerous to Life or Health. This is the maximum concentration of a product present in an environment from which an individual can escape in a 30-minute period, without having symptoms that prevent him from escaping and without suffering irreversible health effects. This concentration has been defined in order to be able to choose an appropriate respiratory protective device. (This designation is published by NIOSH, *National Institute for Occupational Safety and Health*; the French acronym is DIVS: *danger immédiat pour la vie ou la santé*.)

## **Immunosuppression**

Reduction in the immune response (body's defence mechanism).

## **IBE**

Indices biologiques d'exposition. Numerical value used to evaluate the amount of a substance absorbed by the body. The substance or one of its metabolites is measured in a tissue, a biological liquid or in the expired air. This designation is published by the ACGIH®. The English equivalent is BEI® (Biological exposure indices).

## **Insoluble**

A substance that cannot be dissolved in a solvent or a given liquid.

## **Irritability**

Abnormal response to stimuli.

## **Irritation**

Reversible changes in the skin, eyes or mucous membranes (examples: redness, inflammation).

## **K Keratitis**

Inflammation of the cornea (front part of the eye).

## **Keratoconjunctivitis**

Inflammation of the cornea and conjunctiva of the eye.

## **L Lacrimation**

Involuntary flow of tears.

## **Laryngitis**

Inflammation of the larynx.

## **Latency**

State of what exists unseen but that can manifest itself at any time.

## **Lethargy**

Deep and prolonged sleep or extreme indifference.

## **Leucopenia**

Reduction in the number of white blood cells.

## **Lymphocytosis**

Increase in the number of lymphocytes (type of white blood cells).

## **M Manganism**

Chronic poisoning caused by manganese and some of its derivatives.

## **Material**

Term used in the federal law relating to WHMIS (*Hazardous Products Act*). This generic term also includes pure substances as well as mixtures.

## **Metabolic acidosis**

Disturbance of the body's acid-base balance. It corresponds to an excess of acid in the blood. The acid-base balance is the constant balanced ratio of the acids and bases in the body.

## **Methemoglobin**

Hemoglobin whose ferrous iron has been oxidized to ferric iron, which makes it unable to carry oxygen.

## **Methemoglobinemia**

Presence of abnormal concentrations of methemoglobin in the blood, resulting in cyanosis.

**Miction**

To urinate.

**Miscible**

Substances that dissolve completely in each other and form only one phase.

**Molecular formula**

Representation of the chemical elements that make up a pure substance as well as their relative proportions.

**Mucous membranes**

Membranes that line body cavities and that are covered with a viscous substance (mucus).

**Mutagenic (Effect)**

Indicates that the substance can cause changes in the genes (carriers of hereditary information).

**N Narcosis**

Induced sleep.

**Necrosis**

Cell death, tissue death.

**Nephritis**

Kidney inflammation.

**Nephropathy**

Any disease of the kidney.

**Nephrotoxic**

A substance toxic to the kidneys.

**Neurasthenia**

Psychiatric disorder included in the group of neuroses and characterized by asthenia.

**Neuropathy**

Any disorder of the nervous system.

**Neuropathy (peripheral)**

Disorder of the peripheral nerves.

**Neurotoxic**

A substance toxic to the nervous system.

**Neuritis**

Inflammation of a nerve.

**NTP (Normal temperature and pressure)**

Normal temperature and pressure, namely 20°C and 760 mm Hg (101.32 kPa).

**Nystagmus**

Involuntary oscillating or rotating movement of the eyeballs.

**O Oliguria**

Reduction in the amount of urine secreted by the kidneys.

**P Palpitation**

Awareness of one's own heartbeat, felt as a disturbing and sometimes painful phenomenon.

**Paresthesia**

Anomaly in the perception of sensations, or a spontaneous non-painful subjective sensation.

**Patch test**

A patch test consists of applying a small quantity of allergen to the skin, which is covered with a material (occlusion). The objective of this test is to reproduce eczema over a limited area. It is useful in identifying the allergens responsible for eczema.

**Peritonitis**

Inflammation of the peritoneum (membrane lining the abdominal cavity and covering certain organs).

**Petechiae**

Subcutaneous hemorrhage characterized by small red spots.

**Pharyngitis**

Inflammation of the pharynx (throat).

**Photophobia**

Unpleasant and painful feeling in the eyes, caused by light.

**Photosensitive**

Substance that changes in the presence of light.

**Photosensitization**

Abnormal reaction (sensitization) of the skin to light.

**Pneumoconiosis**

Chronic lung disease due to the inhalation of certain types of dusts.

**Pneumonia**

Acute lung infection characterized by inflammation.

**Pneumonitis (chemical)**

Lung inflammation caused by exposure to a chemical.

**Pneumopathy**

Any pulmonary disease.

**Polyneuritis**

Inflammation of several nerves.

**Polyuria**

Excretion of an abnormally large amount of urine during a given period.

**ppm**

Measurement of concentration by volume.

Concentration is expressed in parts per million, for example in  $\text{cm}^3$  of the substance per million  $\text{cm}^3$  of air. By analogy, one part per million (1 ppm) represents the volume occupied by an orange in a carload of goods or a dollar coin in one million dollar coins.

**Procarcinogen**

Substance that must be changed by the body to become a carcinogen.

**Product**

This term applies to a pure chemical as well as a mixture.

**Promoter (of carcinogenesis)**

Substance capable of promoting the carcinogenic effect of another substance (subsequent exposure).

**Prostration**

Extreme exhaustion.

**Psychosis**

A group of mental illnesses characterized by a change in personality and a loss of contact with reality.

**Pulmonary emphysema**

Disease characterized by the dilation or destruction of the pulmonary alveoli.

**Pulmonary fibrosis**

Chronic lung disease producing progressive respiratory insufficiency.

**Pulmonary granulomatosis**

Pulmonary lesion characterized by the formation of small nodules (granuloma).

**Pyrophoric**

Substance that ignites spontaneously in air.

**R Rad**

Radiation Absorbed Dose. Unit of an absorbed dose of ionizing radiation.

**Radiomimetic**

Having an action identical to that of ionizing radiation.

**RADS**

Reactive Airways Dysfunction Syndrome. Also called asthma without latency period. It is caused by exposure to high concentrations of irritating substances.

**Respiratory zone**

Zone inside a hemisphere of 300-mm radius extending in front of the face and with its centre on an imaginary line joining the ears.

**Rhinitis**

Inflammation of the mucous membrane of the nasal passages.

**ROHS**

*Regulation respecting occupational health and safety*

**S Saturnism**

Poisoning by lead or its salts.

**Sensitization**

Reaction of the body resulting from exposure to a physical, chemical or biological agent leading to an allergic response of the respiratory tract (rhinitis, asthma) or of the skin (eczema). Exposure to the sensitizing agent may not have produced any prior consequence until the initial allergic response occurs.

**Siderosis**

Infiltration of tissues by inhaled iron dusts or by iron compounds. **Pulmonary siderosis** is a pneumoconiosis caused by the accumulation of iron dusts in the pulmonary alveoli.

**Silicosis**

Pneumoconiosis, lung disease caused by the inhalation of crystalline silica dust.

**Stenosis**

Narrowing of a natural duct or orifice.

**STEV**

Short-term exposure value.

**STP (Standard temperature and pressure)**

Standard temperature and pressure, namely 0°C and 760 mm Hg (101.32 kPa).

**Strabismus**

Failure of two visual axes to converge on a fixed point (causing cross-eyes).

**Sublimation**

To go directly from the solid to the gaseous state without going through the liquid state.

**Substance**

Term generally used in federal legislation (*Transportation of Dangerous Goods Act*) and provincial legislation (*Regulation respecting occupational health and safety*). This term applies to a homogeneous material of defined chemical composition that cannot be separated by a mechanical process. This definition therefore does not apply to solutions, dispersions, alloys, etc., which are mixtures of several substances. Examples: oxygen (O<sub>2</sub>), hydrogen chloride (HCl).

**Syncope**

Complete temporary loss of consciousness following cardiac and respiratory arrest.

**T Tachycardia**  
Rapid heart rate.

**Tachypnea**  
Abnormally rapid breathing.

**Tetanic**  
Said of a persistent muscle contraction.

**THROMBOCYTOPENIA**  
Reduction in the number of blood platelets.

**Toxicokinetic**  
Study of the fate of a toxic substance in the body. The amount of substance that acts with the body to cause a harmful effect depends on four main biological factors, namely absorption, distribution, metabolism (or biotransformation) and excretion.

**Tumorigenic**  
Tumour producing.

**TWAEV**  
Time-weighted average exposure value.

**U Ulceration**  
Formation of ulcers.

**UN number**  
Alphanumeric designation (two letters, UN, followed by four digits) used to identify a hazardous good or a group of hazardous goods with the same characteristics. It is also used to identify rapidly a substance when it is transported in North America.

**V Vasoconstriction**  
Contraction with narrowing of the blood vessels.

**Vasodilation**  
Dilation of the blood vessels.

**Ventricular fibrillation**  
Rapid and irregular contractions of the muscle fibres of the heart ventricles, characterized by an irregular pulse and that may lead to a stoppage in cardiac output.

## MEASUREMENT UNITS

|                |                                         |
|----------------|-----------------------------------------|
| °C             | degree Celsius                          |
| cm             | centimetre                              |
| kg             | kilogram                                |
| g              | gram                                    |
| kPa            | kilopascal                              |
| l              | litre                                   |
| m              | metre                                   |
| m <sup>3</sup> | cubic metre                             |
| mg             | milligram                               |
| ml             | millilitre                              |
| mm             | millimetre                              |
| mm Hg          | millimetre of mercury                   |
| mppcf          | million particles per cubic foot of air |
| mSv            | millisievert                            |
| Pa             | Pascal                                  |
| ppb            | parts per billion                       |
| ppm            | parts per million                       |
| Sv             | sievert                                 |
| µg             | microgram                               |
| µm             | micrometre or micron                    |

## CONVERSION FACTORS

To convert  $\text{mg}/\text{m}^3$  into ppm  
at  $25^\circ\text{C}$  and 760 mm Hg (101.32 kPa)\*

$$\text{ppm} = \text{mg}/\text{m}^3 \times \frac{24.45}{\text{molecular weight}}$$

To convert ppm into  $\text{mg}/\text{m}^3$   
at  $25^\circ\text{C}$  and 760 mm Hg (101.32 kPa)\*

$$\text{mg}/\text{m}^3 = \frac{\text{ppm} \times \text{molecular weight}}{24.45}$$

To convert  $\text{mg}/\text{l}$  into  $\text{mg}/\text{m}^3$

$$1 \text{ mg}/\text{m}^3 = \text{mg}/\text{l} \times 1000$$

To convert mm Hg into kPa

$$\text{kPa} = \text{mm Hg} \times \frac{133.32}{1000}$$

To convert  $^\circ\text{F}$  into  $^\circ\text{C}$

$$^\circ\text{C} = \frac{(^{\circ}\text{F} - 32) \times 5}{9}$$

To convert  $^\circ\text{C}$  into  $^\circ\text{F}$

$$^\circ\text{F} = \frac{(^{\circ}\text{C}) \times 9 + 32}{5}$$

To convert log Pow into the coefficient of water/oil distribution

$$\text{Coefficient of water/oil distribution} = 10^{-(\log \text{Pow})}$$

To convert the coefficient of water/oil distribution into log Pow

$$\text{Log}_{10} \text{Pow} = -\log_{10} (\text{coefficient of water/oil distribution})$$

\*Only applies to gases and vapours.

# SERVICES OFFERED

## **What services are offered by the CSST's Service du répertoire toxicologique for chemical and biological contaminants?**

- Information on chemical and biological substances taken from the product database. It contains information on physical and chemical characteristics, toxicological properties, preventive measures, first aid and regulations. The Service's web site contains a list of useful links, a glossary, as well as various documents.
- Information on WHMIS.

## **How can you access the services offered?**

- Through the web site at the following address:  
[www.reptox.csst.qc.ca](http://www.reptox.csst.qc.ca).
- By telephone, from 8:30 a.m. to 4:30 p.m. from Monday to Friday inclusively, except statutory holidays, by asking for the professional on duty.
- By mail.
- By e-mail.
- By fax.
- By coming to the office during working hours.

## **Address**

Service du répertoire toxicologique  
1199, rue De Bleury, 4<sup>e</sup> étage  
Montréal (Québec) H3B 3J1  
Telephone: 514 906-3080  
Toll-free: 1 888 330-6374  
Fax: 514 906-3081  
E-mail: [reptox@csst.qc.ca](mailto:reptox@csst.qc.ca)









## CSST REGIONAL OFFICES

### **ABITIBI-**

#### **TÉMISCAMINGUE**

33, rue Gamble O.

#### **Rouyn-Noranda**

(Québec) J9X 2R3

Téléc. : 819 762-9325

2<sup>e</sup> étage

1185, rue Germain

#### **Val-d'Or**

(Québec) J9P 6B1

Téléc. : 819 874-2522

### **BAS-SAINT-LAURENT**

180, rue des Gouverneurs

Case postale 2180

#### **Rimouski**

(Québec) G5L 7P3

Téléc. : 418 725-6237

### **CAPITALE-NATIONALE**

425, rue du Pont

Case postale 4900

Succ. Terminus

#### **Québec**

(Québec) G1K 7S6

Téléc. : 418 266-4015

### **CHAUDIÈRE-APPALACHES**

835, rue de la Concorde

#### **Saint-Romuald**

(Québec) G6W 7P7

Téléc. : 418 839-2498

### **CÔTE-NORD**

Bureau 236

700, boul. Laure

#### **Sept-Îles**

(Québec) G4R 1Y1

Téléc. : 418 964-3959

235, boul. La Salle

#### **Baie-Comeau**

(Québec) G4Z 2Z4

Téléc. : 418 294-7325

### **ESTRIE**

Place-Jacques-Cartier

Bureau 204

1650, rue King O.

#### **Sherbrooke**

(Québec) J1J 2C3

Téléc. : 819 821-6116

### **GASPÉSIE-ÎLES-**

#### **DE-LA-MADELEINE**

163, boul. de Gaspé

#### **Gaspé**

(Québec) G4X 2V1

Téléc. : 418 368-7855

200, boul. Perron O.

#### **New Richmond**

(Québec) G0C 2B0

Téléc. : 418 392-5406

### **ÎLE-DE-MONTRÉAL**

1, complexe Desjardins

Tour Sud, 31<sup>e</sup> étage

Case postale 3

Succ. Place-Desjardins

#### **Montréal**

(Québec) H5B 1H1

Téléc. : 514 906-3200

### **LANAUDIÈRE**

432, rue De Lanaudière

Case postale 550

#### **Joliette**

(Québec) J6E 7N2

Téléc. : 450 756-6832

### **LAURENTIDES**

6<sup>e</sup> étage

85, rue De Martigny O.

#### **Saint-Jérôme**

(Québec) J7Y 3R8

Téléc. : 450 432-1765

**LAVAL**

1700, boul. Laval

**Laval**

(Québec) H7S 2G6

Téléc. : 450 668-1174

**LONGUEUIL**

25, boul. La Fayette

**Longueuil**

(Québec) J4K 5B7

Téléc. : 450 442-6373

**MAURICIE ET****CENTRE-DU-QUÉBEC**

Bureau 200

1055, boul. des Forges

**Trois-Rivières**

(Québec) G8Z 4J9

Téléc. : 819 372-3286

**OUTAOUAIS**

15, rue Gamelin

Case postale 1454

**Gatineau**

(Québec) J8X 3Y3

Téléc. : 819 778-8699

**SAGUENAY-****LAC-SAINT-JEAN**

Place-du-Fjord

901, boul. Talbot

Case postale 5400

**Chicoutimi**

(Québec) G7H 6P8

Téléc. : 418 545-3543

Complexe du Parc

6<sup>e</sup> étage

1209, boul. du Sacré-Cœur

Case postale 47

**Saint-Félicien**

(Québec) G8K 2P8

Téléc. : 418 679-5931

**SAINT-JEAN-****SUR-RICHELIEU**

145, boul. Saint-Joseph

Case postale 100

**Saint-Jean-****sur-Richelieu**

(Québec) J3B 6Z1

Téléc. : 450 359-1307

**VALLEYFIELD**

9, rue Nicholson

**Salaberry-de-Valleyfield**

(Québec) J6T 4M4

Téléc. : 450 377-8228

**YAMASKA**

2710, rue Bachand

**Saint-Hyacinthe**

(Québec) J2S 8B6

Téléc. : 450 773-8126

Bureau RC-4

77, rue Principale

**Granby**

(Québec) J2G 9B3

Téléc. : 450 776-7256

Bureau 102

26, place Charles-

De Montmagny

**Sorel-Tracy**

(Québec) J3P 7E3

Téléc. : 450 746-1036

## NOTES

## NOTES



The purpose of this guide is to facilitate the use and understanding of the information in a substance's material safety data sheet, in accordance with the Workplace Hazardous Materials Information System (WHMIS). The guide provides explanations on the content of the Hazardous ingredients, Physical data, Fire or explosion hazard, Reactivity data, Toxicological properties, Preventive measures and First aid measures sections.

**This publication is available on the CSST Web site.  
[www.csst.qc.ca](http://www.csst.qc.ca) : a Web site linked to your needs!**